

Heul



THE DENTAL PRACTITIONER

A monthly journal for the Practitioner and his Staff

VOL. I, NO. 1-12.

v. 1
1950-51

SEPTEMBER, 1950

CONTENTS

to
August 1951

Editorial : Praktikos

The Use of Bite-wing X-rays in the Conservation of Teeth
A. M. HORSNELL, F.D.S., L.R.C.P., M.R.C.S.

A Case of Progressive Mandibular Asymmetry
DONALD SOUL, F.D.S., R.C.S. (Eng.)

547370
11-8-52

A Review of Local Anæsthesia N. LIVINGSTONE WARD, L.D.S. (Liverp.), D.D.S.

Silver Alloy Amalgam - E. LIEBIG, B.S.

The Dental Nurse - M. JEAN SMITH

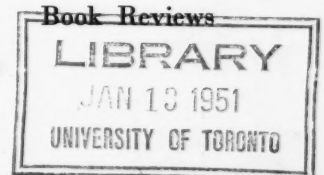
Illustrated Hints

Society Notes

Abstracts from other Journals

COLOURED CHART No. 1

Book Reviews



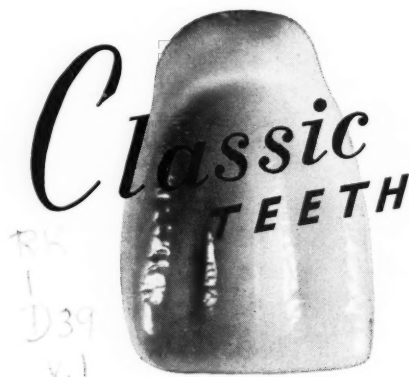
HIN WRIGHT & SONS LTD., 42-44 TRIANGLE WEST, BRISTOL 8

TWO SHILLINGS

PERFECTION *claims*

International Appreciation

As a result of processes developed and perfected by experience and research, CLASSIC represent the closest similarity to tooth perfection so far achieved.



Art and Science combined to give them
PERFECT MOULDS — BEAUTIFUL COLOUR TONES
RESILIENCY — TRANSLUCENCY
CONSTANT UNIFORMITY

Obtainable from your usual dealer or direct from

SOLE WORLD DISTRIBUTORS

COTTRELL & CO.

15-17 · CHARLOTTE STREET · LONDON, W.1

Telephones : LANGHAM 5500 (20 lines)

Telegrams : "TEETH, RATH, LONDON"

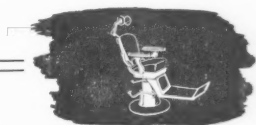
V
E
Pr
—u
inac
jou
of y
guil
"Pr
wor
Th
jour
dent
in an
use o
ever
with
num
struc
We
receiv
The I
expres
tribut
have
very
PRACT

THE DENTAL PRACTITIONER

A Monthly Journal for the Practitioner and his Staff

Vol. I, No. 1

September, 1950



EDITORIAL

PRAKTIKOS

PRAKTIKOS is the Greek for "fit for business"—usage, method, and art, as opposed to disuse, inaction, and disorder. We trust that this new journal will give help in the usage and method of your art, even though you are not, of course, guilty of "disuse, inaction, and disorder". "Practics" rather than "Politics" is our watchword.

THE DENTAL PRACTITIONER is primarily a journal for those engaged in the practice of dentistry. The aim is to publish helpful matter in an interesting and pleasing manner, to make use of the pictorial form of presentation whenever possible, and to be informative and topical without being dull. After reading this first number we believe you will agree that we have struck a new note in dental journalism.

We have been fortunate in this issue to receive substantial assistance from the staff of The London Hospital, and to them we would express our gratitude for the articles contributed and for the enthusiasm which they have displayed and which has been of such very great help in getting THE DENTAL PRACTITIONER "under way". Other eminent

members of our profession have promised or have already submitted articles. It is also our aim to bring you from time to time articles from the Empire, the Continent, and other distant lands.

The coloured chart in this issue is one of a series prepared specially for THE DENTAL PRACTITIONER. We feel sure these charts will be of value as aids in the explanation to your patients of their cases and the appropriate treatment. In alternate numbers it is proposed to issue a series of charts on design of partial dentures, acrylic and cast gold, as a ready reference for the technician.

We want to make this journal one that you will look forward to from month to month with pleasurable anticipation. To do this we must know your wishes. We invite you, therefore, to give us your ideas, to criticize, occasionally maybe to praise, and whenever possible to send contributions. Technical hints, notes and radiographs of unusual cases, and, of course, articles will be welcomed. The high standard we hope to maintain depends very greatly on the efforts of our fellow practitioners.

THE USE OF BITE-WING X-RAYS IN THE CONSERVATION OF TEETH

By A. M. HORSNELL, F.D.S., L.R.C.P., M.R.C.S.

Sub-Dean and Director of Department of Conservative Dentistry, London Hospital Dental School

DESPITE the ever-increasing amount of research into the aetiology of dental caries, and the progress made in preventive dentistry, it remains true that in the present state of our knowledge the major factor in the preservation of teeth is local care, and this is the only truly reliable means of maintaining oral health.

In these circumstances the early detection of caries is one of the most important steps in

in the detection of caries under existing fillings, particularly under the cervical margin of compound restorations and crowns. They are an aid in the assessment of the extent of established cavities and clearly show the advance of caries towards the pulp, indicating at the same time the degree to which the pulp has receded. In extreme cases actual involvement of the pulp by the caries may be diagnosed and thus much time is saved which

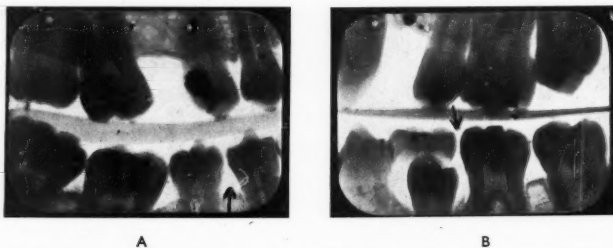


Fig. 1.—Illustrating "etching" or early decalcification at the contact point on the distal surface of the first premolar (A), and earlier still on the mesial surface of the lower first molar (B).

the general approach to the conservation of teeth.

It is in connexion with the detection of early caries, and particularly its occurrence on the interproximal surfaces of posterior teeth, that bite-wing X-rays have such an outstanding use. These films give a picture of the teeth in occlusion and show the maximum number of contact points of both upper and lower teeth on a single intra-oral filling.

The bite-wing X-ray, when used with care, and after some experience has been gained in its interpretation, is far superior for the detection of caries to the routine intra-oral film which is normally used in connexion with periapical conditions.

Bite-wings will reveal small early cavities which it may be impossible to discover by the more common clinical methods. They assist

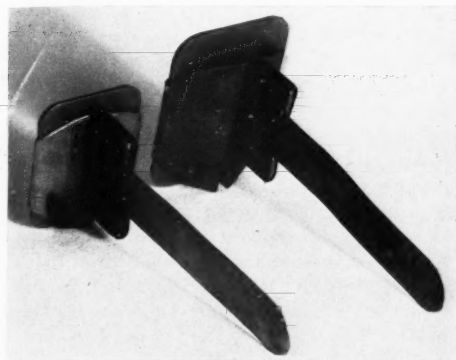
might otherwise be spent in wasted efforts to conserve the tooth. Faults in restorations, such as overhanging edges to cervical margins of interproximal fillings, are clearly demonstrated, and on occasions although this type of restoration may appear clinically to have been well executed, a clear picture is given of inadequate extension for prevention in a gingival direction. This fault is, incidentally, one of the prime causes of the recurrence of caries in this area.

An assessment of the size of the pulp chamber is most satisfactorily made by means of bite-wings, and their use prior to the preparation of a tooth for a jacket crown restoration is regarded as essential.

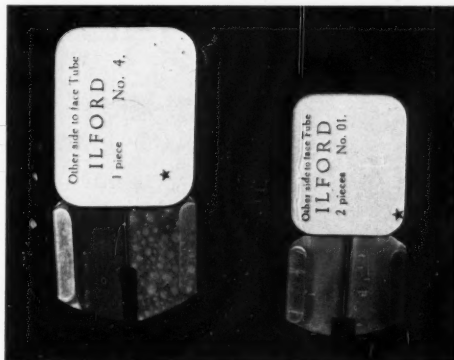
These films are useful for indicating the relationship of the developing permanent teeth to their deciduous predecessors.

The accurate picture of the alveolar margin shown by the bite-wings enables an evaluation of the parodontal condition, and hence affords

demonstrate most clearly that the caries is far more advanced than would have been expected from the clinical examination.



A



B

Fig. 2.—A, B, Showing proprietary type of film holder.

a satisfactory means of checking the progress of any treatment undertaken.

Pit and fissure cavities are not so easily seen in the X-ray until after the dentine has

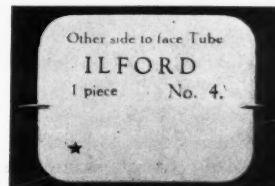
With practice in the interpretation of bite-wing X-rays it is soon possible to diagnose the very earliest attacks of dental caries at a stage before the enamel has been fully penetrated—



A



B



C

Fig. 3.—A, B, C, Illustrating the home-made aluminium film holder.

become involved; at this stage, in these particular cavities, the condition should have been diagnosed by means of mirror and probe examination. Even so, the X-rays will often

this etching of the enamel is demonstrated in Fig. 1 A, B.

In these very early cases steps may be taken to smooth down the roughened surface of the

enamel, polish it, and apply preventive measures both by way of medicaments and by instruction to the patient.

Bite-wings for the detection of caries have their shortcomings, and they should never be used as the only means of examination for cavities. It must be understood that the

cavities, where confusion must occur from time to time because of the shadow of the cavity falling upon that caused by the pulp chamber and canal(s). Another difficulty arises where an opaque metal filling obliterates the shadow of a cavity.

Barr (1945), in a review of interproximal caries in primary school children in New Zealand, examined deciduous posterior teeth and permanent first molar teeth by both clinical and radiological methods. As a result, of the cavities diagnosed, 44 per cent were revealed by radiographic examination only, 6.9 per cent by clinical examination only, and 49.1 per cent were common to, and revealed by, both methods of examination.

In a more recent study by Trithart and Donnelly (1950) upon children in the County of Tennessee similar results were obtained, except that the percentage of additional areas of decay revealed by the radiographic examination was even greater than that in the survey made by Barr.

Similar and equally convincing proof has been given by other workers (Delabarre,

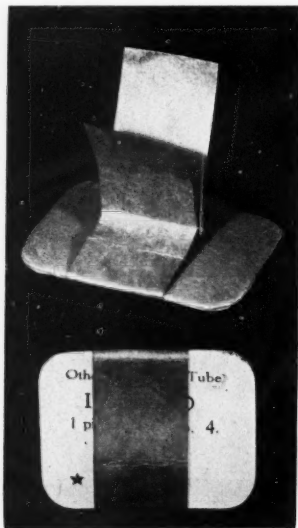


Fig. 4.—Showing the method of using a strip of strong paper to hold the film.

first method of examination of the mouth should be by means of a mirror and sharp well-kept explorers, the five surfaces of the crown of each tooth being carefully scrutinized in a dry field. As an adjunct to this usual form of examination, bite-wing X-rays are invaluable, but they cannot and must not be regarded as an alternative. On completion of the bite-wing X-ray examination and the interpretation of the films, the teeth should be re-examined with the X-rays readily available. By this means the omissions and faults of the original clinical examination will be revealed and, under such circumstances, in time the efficiency of the mirror and probe examination will become much improved.

One of the major failings of the bite-wing X-ray is in connexion with buccal and lingual

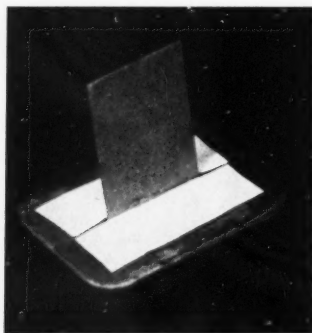


Fig. 5.—A reinforced index tab attached to the film cover on the sensitized side.

1933; Fixott, 1937; Smith, 1942; Dunning and Ferguson, 1946).

In patients selected at random in the London Hospital Dental Department 34 interproximal cavities were discovered by means of the mirror and probe and 105 interproximal cavities were diagnosed by means of the bite-wing X-rays, showing an increase of 208.8 per cent.

FILMS

Before the 1939-1945 War it was possible to purchase special bite-wing films, but unfortunately these special films cannot at present be obtained. Under the circumstances a variety of methods have been devised to enable the ordinary intra-oral films to be used as bite-wings.

Special holders are obtainable from the makers of X-ray appliances and are known as "The Caries Film Holder" (Fig. 2 A, B). The main advantage of this particular type of film holder is that the extension of the bite-plate outwards gives a clear indication for the

side (Fig. 5). Adhesive tape has been used instead of paper, but this has not proved satisfactory in that it is messy and does not provide the stability which is essential.

POSITIONING AND ANGULATION

Positioning of the film is most important and its final placing can make or mar the results which will be obtained. It is placed in position with the centre of the film in the centre of the area to be photographed, with the holder, whether this be cardboard, paper, or metal, gripped firmly but not unnecessarily hard between the teeth. In the posterior



Fig. 6.—Position of the tube and film holder—posterior teeth.

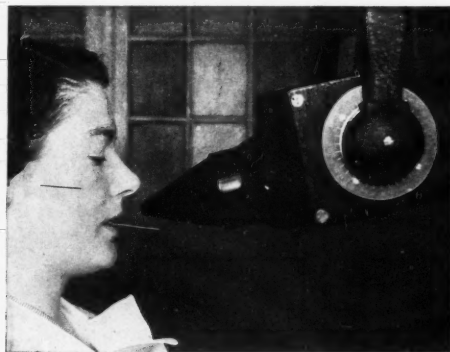


Fig. 7.—Position of the tube when photographing anterior teeth.

direction of the central ray. It has been found in practice, however, that the holder is rather bulky and consequently uncomfortable. Unless the patient is completely comfortable it is unlikely that the best results will be obtained.

A popular home-made device is to cut a bite-plate holder from thin sheet aluminium (Fig. 3 A, B, C). This is an excellent method in that the aluminium holder is readily sterilized and easily used, but it has the disadvantage that the metal tends to spread and after a short time the holder fails to grip the film firmly and requires renewal. A further improvisation which does not necessitate a special holder is for the film to be gripped by means of a strip of strong paper (Fig. 4), the ends being brought out to be held between the teeth, or again, an index label or tab may be attached to the film cover on the sensitized

regions the patient is asked to "close the mouth" (not to "bite") in a position of centric occlusion (Fig. 6), while for the anterior teeth the bite is edge to edge (Fig. 7).

Before the film is placed in the mouth its corners should be slightly bent, in order to avoid the discomfort which would otherwise be caused by the hard film pressing into the mucosa.

The occlusal plane of the upper teeth should be in the true horizontal: to ensure this the head is placed with the line joining the tragus of the ear to the ala of the nose parallel to the floor; the tube is directed with its central ray at right angles to the line of the arch, that is, so that it rests in a position perpendicular to the mean tangent of the teeth under examination, as in Fig. 8. Unless

particular attention is paid to the direction of the central ray in this plane overlapping shadows will result which render the film useless for the detection of early interproximal

In the vertical plane allowance has to be made for the bending of the film which results from the anatomical curve of the palate (Fig. 10). Thus while the elevation of the tube

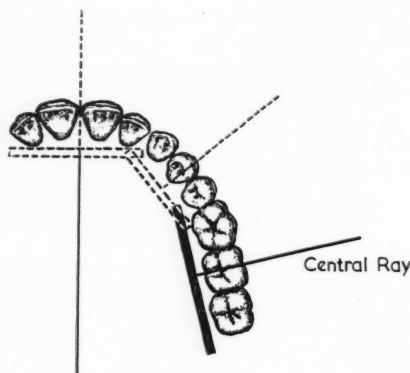


Fig. 8.—Showing direction of the central ray at right angles to the film.

cavities. In certain cases, where for instance a tooth is standing out of the line of the arch, it may be necessary for the direction of the central ray to be altered (Fig. 9) in order to

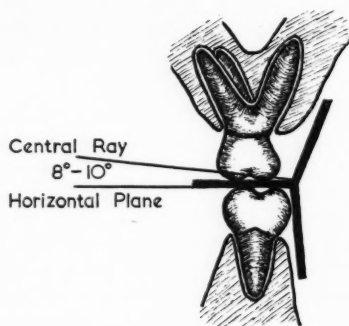


Fig. 9.—Illustrating the direction of the central ray in order to avoid overlap in special cases.

avoid an overlapping which would occur with the standard technique. In such cases two or more films of the area should be taken—the first for all the teeth in the normal position with the standard approach at right angles to the line of the arch; and a special film(s) for any teeth abnormally placed.

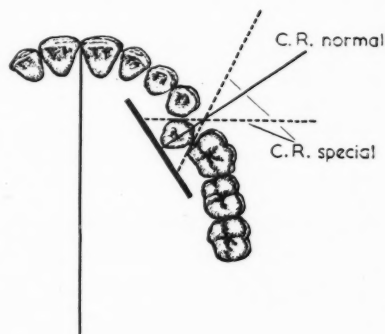


Fig. 10.—Diagrammatic illustration of the direction of the central ray in the vertical plane.

should be 0° for the lower teeth, it would require to be depressed to 15-20° for the upper teeth; hence to provide a satisfactory photograph it is usual to have the tube depressed to an angle of 8-10°, with the central ray directed at the mid-point of the film, on the line of occlusion between the upper and lower teeth.

Too much tension must not be exerted on the bite-tab before the teeth are closed, otherwise bending of the film will be exaggerated; the angle quoted will be incorrect and distortions will result. To avoid this difficulty when photographing anterior teeth it has been recommended that small cotton rolls be pasted on each side of the bite-wing tab. The cotton rolls rest against the lingual surfaces of the teeth, prevent movement of the film by the tongue, and serve to avoid possible distortion by keeping the film in a vertical position.

EXPOSURE TIME

The period of exposure for bite-wing X-rays is longer than that required when using identical films for intra-oral pictures. A safe rule is to increase the usual exposure period by

20 per cent. The resulting film will naturally appear darker than usual, but it must be borne in mind that the examination is being made in detail of hard tooth substance, in contradistinction to the usual clinical X-ray picture which is of alveolar bone, periodontal membrane, and their relation to the tooth or teeth therein supported.

Five films are generally regarded as necessary and adequate for the examination of a full mouth: two for the molar regions, two for the premolar and canine regions, and one for the anterior teeth. Some operators prefer seven films, the extra two being used to give a separate picture of the canine, or canine and lateral incisor, regions.

On occasions, when X-ray films are in short supply, as was the case in recent months, two bite-wing films only will suffice, one for each side covering the molar and premolar regions, for it is in this area, as has already been stated, that the greatest number of undiagnosed interproximal cavities occur. Naturally such an economy must be regarded as a stop-gap measure, and whenever possible the full series of five films should be taken.

In the opinion of the writer, bite-wing X-rays are a necessary adjunct to the usual methods of examination in the vast majority of mouths where conservative treatment is to be undertaken, and essential in all patients requiring conservative treatment under the age of 25 years. It is impossible in a mouth containing a normal complement of teeth to state that all clinical caries has been eradicated and the cavities restored unless a bite-wing examination has been made before the patient is finally dismissed.

Bite-wing X-ray examinations should be made in children and adolescents at least once every twelve months, for only by this means is it possible to ensure the discovery of early caries and to render the prompt treatment required. Musterman (1945) states: "If the practice of making periodic bite-wing examinations of the teeth were to become general the pulpless teeth problem facing the profession would be a thing of the past." This statement may be a little optimistic, but it is safe to say that if regular bite-wing examinations

of the posterior teeth could be made in all children from the age of 4 years onwards, and if the cavities disclosed could then be treated, the population would show a very different picture of dental health than it does to-day, and in particular the avoidance of the evils which result from the early loss of deciduous teeth would relieve the orthodontist of a great and unnecessary burden.

SUMMARY

Bite-wing X-rays are useful for the following reasons:—

1. To detect early interproximal caries.
2. To detect caries under existing restorations.
3. To assess the extent of established caries.
4. To provide a check upon existing restorations.
5. To examine pulp chambers.
6. To assess the condition of the alveolar crest for parodontal changes.
7. To demonstrate the developing permanent dentition and to show its relation to the deciduous teeth.

FACTORS AFFECTING INTERPRETATION

1. Incorrect alinement of the central ray, resulting in overlapping shadows of the approximal surfaces of the teeth.
2. Incorrect positioning of the film:—
 - a. Anteroposteriorly, or vertically.
 - b. Tilting—due to an inefficient holder.
 - c. Too much tension on the tab at the time of closure of the teeth.
3. (a) Shadows of cavities being superimposed on shadows occurring naturally in the teeth; (b) Masking of a cavity by overlap of extensive radio-opaque fillings.
4. Confusion caused by deviations, within the range of normal, in tooth structure. Commonly occurs at the necks of molar and premolar teeth, where the enamel is thin and the root concave; the appearance of a cavity is given where one does not in fact exist.
5. Under-exposure of the film.
6. Silicate cement and other radiolucent restorations give the appearance of a cavity. On re-examination of the mouth and checking

with the films the artefact will be easily recognized.

My thanks are due to Miss Marshall and Miss Lancaster, of the London Hospital Photographic and Radiographic Departments, for their assistance with the photographs and X-rays: to Miss Archer, medical artist, London Hospital Medical School, for the drawings: to Miss Jezzard for her assistance in the preparation of the article: and to Messrs. Watson & Sons (Electro-Medical) Ltd., Sunic House, Parker Street, London,

W.C. 2., for the loan of the caries film holder illustrated in Fig. 2 A, B.

REFERENCES

- BARR, J. H. (1945), *N. Z. dent. J.*, **41**, 89.
DELABARRE, FRANK A. (1933), *J. Amer. dent. Ass.*, **20**, 124.
DUNNING, J. M., and FERGUSON, G. W. (1946), *U. S. nav. Bull.*, **46**, 83.
FIXOTT, HENRY CLINE (1937), *J. Amer. dent. Ass.*, **24**, 91.
MUSTERMAN, H. W. (1945), *Principles and Practice of X-ray Technique and Interpretation*.
SMITH, RUSSELL K. (1942), *J. Amer. dent. Ass.*, **29**, 796.
TRITHART, A. H., and DONNELLY, C. J. (1950), *Ibid.*, **40**, 33.

A CASE OF PROGRESSIVE MANDIBULAR ASYMMETRY

By DONALD SOUL, F.D.S., R.C.S. (Eng.)

London Hospital Dental School

THE case to be described is one of unilateral hyperplasia of the mandibular condyle, resulting in a progressive deformity of the lower jaw.

of difficulty in chewing her food. She had for some years noticed an enlargement of the left side of her lower jaw, which had become progressively worse.



Figs. 1, 2.—Patient at ages of 6 and 8 years, taken with her twin sister, who is normal.

CASE REPORT

History.—The patient was a healthy looking, intelligent woman, aged 24, who sought treatment from her dentist for an acute alveolar abscess of /1. She also complained that she experienced pain in the left temporomandibular joint on opening her mouth widely and

Past History.—The patient admitted to measles at 3, mumps at 10, and had complained of earache on the left side for a number of years during early adolescence. There was no history of trauma.

On Examination.—A considerable deformity of the lower part of the face was apparent

(Fig. 3A), the chin being deflected to the left side of the midline, the lower border of the left mandible being at a considerably lower

angle. The respective measurements from the anterior border of the ascending ramus to the midline were: left side 5.9 cm., right



Fig. 3.—The sisters at 24 years of age.

level than the right. The right corner of the mouth at rest was higher than the left. The left malar bone appeared to be larger and

side 5.3 cm. The left condyle was prominent and easily palpated, but the right could not be felt, nor could movement be detected in



Fig. 4.



Fig. 5.



Fig. 6.

Figs. 4-6.—The patient at 12, 17, and 21 years of age.

more prominent than that on the other side. The left mandible was obviously longer than the right, the lower border having a rounded appearance, with loss of definition of the

the external auditory meatus. Movements of the mandible were, however, fairly full, pain being felt in the left joint at the limit of opening. There was some tenderness to

palpation over this joint. The dentition was defective, with $\frac{874321}{854321}$ $\frac{23}{1234}$ $\frac{78}{8}$ standing, the



Fig. 7.—Postero-anterior view, showing enlarged left condyle.

bite being grossly deranged, $\frac{84}{84}$ only being in partial occlusion. On the left side the bite was open, with a gap of 0.5 cm. between $\frac{78}{8}$.

X-ray Appearances.—

Mandible.—The vertical height of the left body was greater than the right, the lower

border having a distinct curvature. The vertical measurement of the ascending ramus is also greater on the left than the right, and narrower in an anteroposterior direction (Fig. 8 A, B). In P.A. view (Fig. 7) the left condyle is greatly enlarged, particularly in a medial direction. Lateral views show the same enlargement, the articular surface of the condyle being very irregular, with a nodular projection on the distal aspect. On the right side, it proved extremely difficult to obtain a satisfactory view of the condylar head, but it appears to be of normal size. Movement of the enlarged condyle appears to be greater (Figs. 9, 10).

Maxillæ.—The antra are normal and equal in size, the floors being at the same level. The clinical impression that the malar process was larger on the left side is not borne out by the X-rays (Fig. 7).

Progress of the Deformity.—Figs. 1-6 trace the progress of the condition. Figs. 1-3 show the patient at the ages of 6, 8, and 24 with her twin sister, who is seen to be normal. Figs. 4-6 show the patient at 12, 17, and 21.

From an examination of these photographs it can be seen that the deformity first made its appearance between the ages of 8 and 12. The most rapid growth appears to have occurred between the ages of 12 and 17. Between 17 and the present age of 24 the increase is less rapid. As histological evidence is not available, it is not possible to say that growth has ceased.

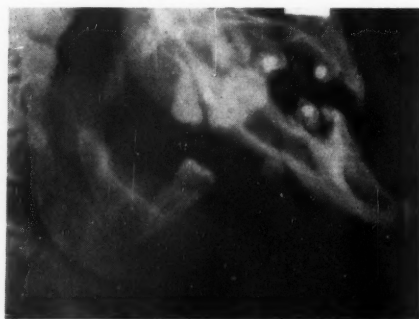


Fig. 8.—30° lateral views of body of mandible. A, Left side; B, Right side.

Treatment.—The patient does not wish to undergo operation for correction of the condition. Treatment is therefore being confined

this case and the London Hospital Photographic and Radiographic Departments for the photographs and X-rays.

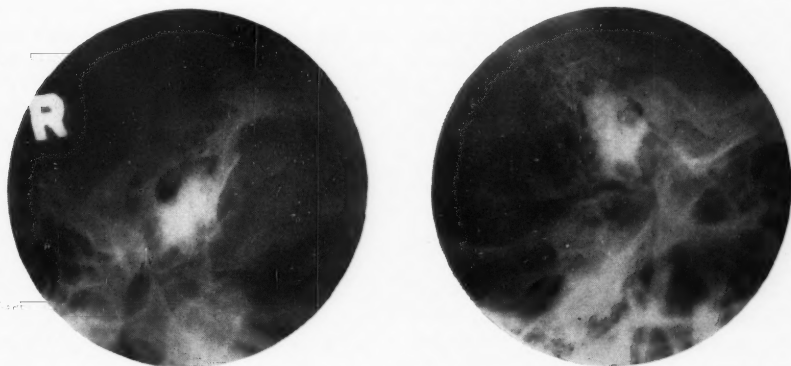


Fig. 9.—Condyles, mouth open.

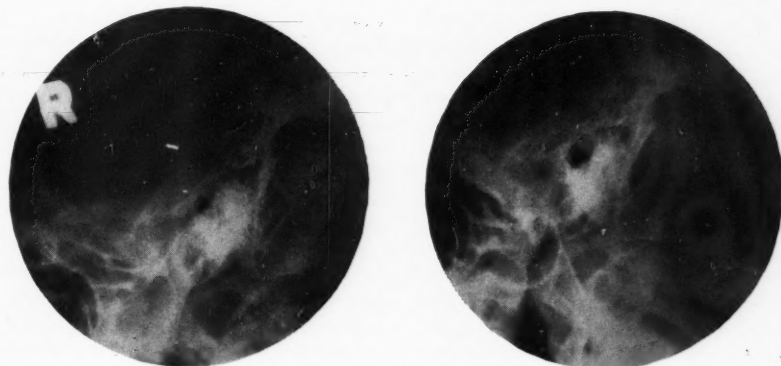


Fig. 10.—Condyles, mouth closed.

to improving the masticatory function and relieving the pain in the joint.

COMMENT

This case is similar in many respects to that recently reported by Balderston (1950). One notable difference is the almost complete lack of compensatory growth of the alveolar processes on the affected side to maintain occlusion.

Acknowledgements.—I have to thank Professor A. E. W. Miles for permission to publish

BIBLIOGRAPHY

- BALDERSTON, W. B. (1950), *Brit. dent. J.*, **88**, 25.
 RUSHTON, M. A. (1946), *Proc. R. Soc. Med.*, **39**, 431.
 — — (1948), *Dent. Rec.*, **68**, 80.

“Armed with little more than an electric torch and a spatula, the practitioner can, if he will, become a master of intrabuccal living pathology and diagnosis.”—*Hamilton Bailey.*

A REVIEW OF LOCAL ANÆSTHESIA*

By N. LIVINGSTONE WARD, L.D.S. (L'pool), D.D.S.

Senior Assistant to Director of Operative Dental Surgery, London Hospital Dental School

FOR an understanding of the science and art of local anæsthesia it is essential that there should be also an understanding of the problem of pain. For it is by the exquisiteness of pain and its absence that the efficacy of a local anæsthetic is judged.

It is not generally realized that the modern conception of pain has been formulated fairly recently. Previously it was always thought that pain was, in the words of Aristotle, "... a passion of the Soul". For centuries past it was believed that pain was not a sensation but a form of feeling, that it could not be classed with the sensations of touch or temperature, that it did not have peripheral end-organs; there were no nerves in existence which on irritation alone would produce pain; that there was no such thing as a pain tract. Pain was a sort of opposite to pleasure—it could be prevented to a certain degree by drugs in the same way that pleasure could be stimulated to a degree by other drugs.

Whatever the theories of pain and its nature, it has always been natural for man to try to discover some means to mitigate the pain arising from injury or the terrifying experience of the surgeon's knife. Pain has probably been felt since life began on this planet, and since the rise of man and the change from biological instinct to the rational thought of the human race, every devil, drug, and doctor, every charm, spell, incantation, and mumbo-jumbo, has had its day in an endeavour to conquer the problem of pain. The oldest known prescription for the relief of toothache is written on a tablet dated about 2250 B.C., at the time of Hammurabi, King of Babylon, and a contemporary of Abraham. The contents of the tablet speak of the worm theory of dental decay, and the treatment consisted of filling the painful cavity with a cement prepared by mixing powdered henbane with gum mastic. Other methods make delightful reading and

are interesting comparisons between different civilizations. Three thousand years after our first prescription we find in an early Cymric manuscript, about the fifteenth century, the following:—

How to extract teeth without pain.

Take some newts, by some called lizards, and those nasty beetles which are found in ferns in the summer. Calcine them in an iron pot and make a powder thereof. Wet the forefinger of the right hand, insert it in the powder and apply to the tooth frequently, refraining from spitting if off. The tooth will fall away without pain. It is proven.

An amazing variety of drugs were used, and one enterprising charlatan in 1858 recommended the attachment of an electric current to the forceps for the painless extraction of teeth. Probably the most useful local anæsthesia in ancient days was by the production of cold. It is mentioned by Hippocrates in 400 B.C., and was again applied in general surgery in 1943 by a U.S. Navy surgeon; both used ice-packs on the limbs. Centuries were to pass while humanity spent its time discovering newer and better ways of inflicting pain and forgetting how to prevent it. It is hard to realize that ether was discovered in the thirteenth century and was actually used to put chickens to sleep. We had to wait until the last century, when in 1853 Alexander Wood discovered the hypodermic syringe, and the turning point came with the first clinical demonstration in 1884, by Halsted, of an intradermal injection of cocaine as a local anæsthetic for the relief of pain during an operation. Since then the science of local anæsthetics has gone forward with the discoveries of the synthetic substitutes for cocaine, notably procaine. We have now reached an age when completely painless dentistry is within range, an age when the problem of pain is rapidly being solved to the benefit of mankind.

* Read before the London Hospital Dental School Study Circle, April, 1950.

The old conception of pain was radically changed by the research work of many notable men, both anatomists and physiologists, who proved that pain is a separate entity in itself, with its own peripheral nerve end-organs and pain tracts, which on stimulation produce the sensation of pain. In this work that still goes on, there is evidence to show that a tooth is only equipped to give rise to the sensation of pain, irrespective of the type of stimulation, be it touch, temperature, or pressure. Another point of interest to dental surgeons in this work, is that there are certain areas over the body from which pain cannot be elicited, and one of these areas is situated on the inside of the cheek opposite the second lower molar tooth.

Dental local anaesthesia concerns the mitigation of pain in two quite different structures—the teeth and the supporting tissues. If we accept the idea that a tooth can only transmit pain sensations and none other, it does help to understand why it is more difficult to anaesthetize a tooth for conservative treatment than for an extraction. Any stimulus on the tooth will give rise to a feeling of pain, whereas on the soft tissues it will give rise to its appropriate sensation, touch, temperature, or pressure, which will be distinguished from pain by the patient. Function in the affected nerves during local anaesthesia is lost in a definite order. Vasoconstrictor action is lost first and then temperature, followed by pain, touch, and pressure. In cutting a tooth for cavity preparation both touch and pressure will give rise to a sensation of pain and not the appropriate sensation, and it is this fact that proves it is easier to anaesthetize a tooth for extraction than for conservative treatment. The depth of anaesthesia must be greater for one than for the other.

The physiological factors that have to be taken into account in discussing the effectiveness of local anaesthesia are those of facilitation and summation.

If the resistance of any given path to a nerve impulse is overcome by a powerful stimulus the synapse resistance is reduced, and the pathway can be used with greater ease by succeeding stimuli. This phenomenon

is known as facilitation, and explains the fact that the more a person suffers the more susceptible he becomes to painful stimuli, whether under the influence of narcotics or not. Facilitation is demonstrated when an inferior dental nerve local anaesthetic injection is administered, and treatment commenced immediately. Pain is produced before the anaesthetic acts, and the impulse through the nerve tract reduces the synapse resistance and will ease the path of further stimuli, despite the action of the local anaesthetic. One, in fact, tends to balance out the other, and pain will be experienced throughout the treatment. It is usual in these cases to blame the patient or the anaesthetic, but it may be due to this phenomenon.

Summation is the accumulative effect of repeated light stimulation on nerve tissue. Initially the stimulus does not cause pain, but as the stimulus is repeated each light stimulus will commence to produce pain. Teeth that have been subjected to repeated light stimuli causing drawn-out toothache become highly sensitive until the very slightest stimulus in the form of a wisp of cotton-wool will cause acute pain if the pulp is exposed.

If such a tooth is anaesthetized the nerve must not be stimulated to find if the anaesthetic has acted, or the phenomenon of facilitation will operate and subsequent treatment will be painful. To overcome these factors all that is really necessary is to ensure that a good anaesthesia is administered and that plenty of time is given for it to act, before even touching the tooth. These are very important factors in the understanding of local anaesthesia, but it will be appreciated that one stimulus will not produce these phenomena in the ordinary cavity preparation to be of clinical importance. They will only occur when there has been constant and repeated stimulation, for instance, an aching tooth with periodontitis or an exposed pulp after a fracture, or a painful cavity which has been repeatedly stimulated by a rapidly revolving bur before anaesthesia has developed. To sum up, it must be realized that if a powerful stimulus passes through the nerve-tract the threshold of pain is temporarily reduced and the depth of

anæsthesia must accordingly be deepened. In all cases of local anæsthesia it is essential to wait until the anæsthetic has completely developed before operating is commenced.

LOCAL ANÆSTHETIC DRUGS

Local anæsthesia comprises all methods of abolishing sensitivity to pain which do not at the same time involve loss of consciousness. The method in general use is to paralyse by drugs the sensory nerve-endings or the main nerves themselves which receive impulses from the site of operation. These drugs may be applied on the surface or by injecting them into the tissues, bringing them into intimate contact with the nerves. There are other ways in which loss of local sensitivity may be produced, but they are used only in special circumstances. One of these methods is by the production of cold. Freezing of the superficial tissues paralyses the irritability of sensory nerve-endings, so sprays of highly volatile fluids, which by rapid evaporation abstract heat from the tissues, are directed on to the tissues for quick and simple operations, such as the opening of small abscesses or the removal of loose teeth. Ethyl chloride is usually employed, but thawing may be painful, and prolonged application may cause necrosis. Restarski (1944, 1946) reports a method of refrigeration of the tooth for conservative treatment. It is obtained by a small refrigeration apparatus connected to two adaptors which fit on to each side of the tooth on the gingival surfaces of the gum. The temperature is very slowly reduced to 2 or 1° C. The tooth cavity may be prepared quite painlessly and it is claimed that there is no after-pain. The histological investigation of tissues subjected to continuous local refrigeration for as long as two hours is claimed to disclose no pathological cellular change. Pressure on the nerves has been used to produce anæsthesia, but is now rarely used. It can be used sometimes to extract a very loose tooth lying in soft tissue. In these cases it may not always be the pressure but the distraction of the patient by gripping the jaw that reduces the pain. The pain threshold may be obliterated by local anæsthetic drugs, but it has been

shown that it is influenced by attitude and suggestion. Hypnosis, auto-suggestion, and distraction by beating a big drum will all increase the threshold. Our ancestors were perhaps more clever than they thought.

The usual way of inducing local anæsthesia in dentistry is by injection of an appropriate drug into the tissue near the site of operation. The drugs commonly used to-day are procaine, monacaine, and more recently xylocaine. Since cocaine has been found to be too toxic, numerous synthetic compounds have been discovered that have replaced the older drugs, e.g., thiocaine, panthesin, nupercaine, ethocaine, and apothesine, as well as the three mentioned above. *Procaine* was one of the first, and has ever since remained in ascendancy. *Procaine* is a synthetic preparation, and for local injection is used in the form of procaine hydrochloride. Its toxicity is only one-fifth to one-seventh that of cocaine; it can be sterilized by boiling, and when injected into the tissues produces no irritant effects. Unlike cocaine, it is a vasodilator, so that the solution of procaine is always combined with adrenaline. The effect of adrenaline is important; its vasoconstrictor action enhances the anæsthetic properties of procaine, retards its absorption into the circulation, and prolongs its action. The safety of procaine depends upon the slowness of its absorption, which allows time for adequate detoxification by the liver. Nevertheless, adrenaline is the necessary evil of procaine and may set up side-reactions itself, which must be closely watched.

Monacaine is a close chemical relation of procaine which is more extensively used in America. It appears to have certain advantages over procaine in that its vasodilatory property is very small, with a consequent reduction in the percentage of adrenaline necessary. A 2 per cent solution of monacaine with adrenaline 1-50,000 is as potent as a 4 per cent solution of procaine. Normally a strength of 1.5 per cent is sufficient. Recently monacaine has been combined with isonepicaine, a narcotic drug, under the name of *Monerone*. It is a method of premedication by co-medication, the local anæsthetic and the premedication drug being injected at

the same time. This method has undoubted advantages, but the drug must be used with the greatest care, and only in those cases where it is thought to be essential for the control of the case. It does not, however, overcome the apprehension of the injection, which causes a certain amount of nervousness in nearly all patients.

Xylocaine, the most recent addition to the profession, appears to have further advantages over both procaine and monocaine. It is claimed that it is more profound in effect and more rapid in action, and the adrenaline content is even smaller than that in monocaine. Its security coefficient is from two to four times higher than procaine, while monocaine is slightly lower than procaine. *Xylocaine* will undoubtedly be an asset in dental surgery.

The mode of action of these drugs is not altogether known. They are all lipid-soluble alkaloids of which the non-irritant water-soluble salts are used for injections. It is believed that these salts are hydrolysed by the slightly alkaline tissue fluids, and that the resulting alkaloidal bases are taken up by the lipids in the nerve tissues. It is possible that the alkaloidal salt may become ionized, with the production of a positively-charged analgesic ion, which may be taken up by a negatively-charged nerve structure. Whatever the mechanism, the result is a depression of the nerve without previous stimulation. For full anaesthetization of a nerve the local anaesthetic drug must first saturate the nerve or nerve-endings, either directly or by diffusion through other tissues to the nerve. It must then penetrate the nerve-fibres until the central portion of the nerve is saturated as well. It is believed that the nerves from the pulpal portion of the tooth pass through the central fibres of the nerve-trunk, and are the last to be anaesthetized. From all clinical aspects it is essential that time must be allowed for the complete anaesthetization of all the fibres within the nerve-trunk.

The speed and comfort of the anaesthetic is dependent on the strength of the solution and the type of the solution that acts as the carrier for the drug. The strength will largely

depend upon the toxicity of the drug and its pharmacological properties. The carrier solution is dependent upon numerous other factors. Theoretically it is desirable to inject solution into the tissues which are iso-osmotic and buffered to the same pH as the tissue fluids. Clinically, within reasonable variations, this is not altogether necessary.

As it appears that the procaine hydrochloride is transformed into procaine hydroxide in the tissues, it would seem that the solution would be best if it were of an alkaline nature. It is true that procaine borate is a better anaesthetic agent than procaine hydrochloride, being less toxic and quicker in its action, but unfortunately the solution, being alkaline, is unstable and does not keep. The pH of the procaine borate is 8.3 and that of procaine hydrochloride 5.5, the pH value appearing to determine the speed and duration of the anaesthetic. The ideal pH would be 7.2. In some solutions the alkalizing agent is added to the solution just before the injection. It should be remembered that the critical pH value for blood is 7.5, below which haemolysis occurs. It is interesting to recall here the experiments carried out at Northwestern University. It was found that in a solution of 500 c.c. of 0.2 per cent procaine hydrochloride it took fourteen minutes to anaesthetize a number of goldfish in the solution, while it took only fifty seconds in a solution of 0.2 per cent procaine borate. The fish were revived in fresh water, but built up a tolerance to the drug.

The solution should also be theoretically isotonic—that is, having the same osmotic pressure as the body cells. If the solution is not compatible with the isotonicity of the tissue fluids then dehydration may take place in the cells owing to the change of osmotic pressure, causing oedema or, alternatively, cellular damage by too much fluid in the cell. Usually the solution consists of 0.5 per cent NaCl, 0.2 per cent KCl, 0.4 per cent CaCl_2 , and 0.1 per cent Na_2CO_3 . The conductivity of nerves is depressed by potassium salts and a higher percentage of KCl is sometimes used. Trainter and Thronson (1940, 1941) find that this is of little clinical use.

Unfortunately, from all the experimental evidence by blind clinical tests, it appears that these two factors of buffering and isotonicity are not as important as they seem to be. There appears to be no particular advantage in the complex formulæ over the simplest prepared solution of procaine hydrochloride in 0.5 per cent NaCl. The solution should never be injected into the blood-stream, and the small amount injected into the tissues does not appear to damage the cells to the extent that theory would have us believe. The whole of this aspect of local anæsthetic agents and their solutions seems to be slightly misleading and confusing. The future probably lies in new anæsthetic drugs rather than changes in the solution carrier.

TECHNIQUE

The art of local anæsthesia by injection must be based on sound anatomical knowledge. General principles may be laid down for the various techniques, but there are no rule-of-thumb methods for obtaining immediate successful anæsthesia. The technique has to integrate individual anatomical structures, and owing to their variations cannot be performed by measurements, but only by selecting landmarks which are correlated to each other so that their recognition makes the operator independent of these variations. Most landmarks are points of the skeleton, and these may be seen by the eye, palpated by the finger, or found by examination of the deeper tissues, using the point of the needle as a probe. It is obvious from this that the anatomical knowledge must be very exact if the anæsthetic solution is to be placed correctly at the desired nerve structure.

Numerous techniques have been evolved for injecting anæsthetic agents into the tissues to obtain local anæsthesia of a single tooth or a group of teeth. All these methods have been well publicized, and it is not the intention of this paper to repeat the well-known descriptions in detail. An account of their anatomical basis will be given in general terms.

The methods employed can either paralyse the nerve-endings in the tissues or reach the more centrally located nerves to block their

conduction of pain impulses. They can be roughly divided into three groups: (1) Infiltration; (2) Injections into the bone; and (3) Regional anæsthesia of the main nerve-trunks.

Anatomically the infiltration method is dependent on the denseness of the bone overlying the tooth, for the solution is deposited in the soft tissues around the apical area of the tooth and must diffuse through the alveolar plate before anæsthesia takes place. As the bone constituting the maxilla and mandible varies considerably in density, this method is not always effective, and in some cases impractical. In an endeavour to overcome these difficulties methods have been devised to inject the solution nearer the bone and create a certain amount of pressure which would tend to force the solution through the bone. These are the subperiosteal and supra-periosteal injections. The injection is made into the gum below the attachment of the buccal fold and just above the periosteum in the one and underneath the periosteum in the other. As the tissues are very thin, there would appear to be little difference in the two injections, although it is always stated to be wrong to inject under the periosteum. Clinical reports of the two methods are similar. The method can only be used in selected cases to be of real value and is possibly the method of choice in operations on the gingival tissues. Progressing further along anatomical lines, the technique of bone injections was perfected—usually referred to as the intra-osseous methods. They may be divided into two types: one, where the cortical bone is not drilled to admit the hypodermic needle—the periodontal and intra-septal injections; and the other, where the bone is drilled to admit a special type of hypodermic needle—the modified intraseptal and the intra-alveolar injections. The rationale and anatomical basis for these methods is well known; the intra-alveolar, usually referred to simply as the intra-osseous injection, opened a new field in dental local anæsthesia. The main danger of all intra-osseous methods is the possibility of carrying infection into the cancellous bone, and the technique must be carried out

with care and circumspection. It should not be used where infection is already present, or in cases of parodontal disease, swelling, or inflammation.

The periodontal injection is made between the cementum of the tooth and the alveolar bone, above the circular ligament. A short needle with a long hub is used, making a needle length of 8 mm., and 10 to 15 minims of solution are injected. The intraseptal injection is not effective enough for routine treatment, as it can never be certain that the needle will penetrate the interdental bony septum. The same size of needle is used as for the periodontal injection, and is directed through the tissues at the tip of the interdental crest in a line parallel to the long axis of the tooth. The mucoperiosteum is pierced and the needle advanced by pressure through the bony septum and 10 to 15 minims of solution deposited. This injection is better performed by drilling through the cortical bone just above the interdental crest, injecting directly into the cancellous bone. The intra-alveolar injection is performed by drilling a small hole into the bone at a higher point between the apices of adjoining teeth. The technique is, first, to give a small injection suprapariosteally to anesthetize the mucous membrane, and to drill a hole through the cortical bone to the cancellous bone, using a rose-head bur, a Gates-Glidden drill, or a Kerr's reamer, No. 5 or 4, in a dental engine. The instrument should be pressed on to the tissue before drilling, to avoid any pulling of the soft tissue. The 25-mm. needle is used in a long hub and the end of the needle is cut across square, leaving the needle length of about 3 to 4 mm. The operator should endeavour to keep the drill at right angles to the bone, and it is slightly easier in the mandibular molar region to use the lingual approach, and in the maxillary molar region the palatal route. Great care must be exercised in choosing the point of drilling, and anatomical structures must be plotted first.

Despite all these techniques at our command there still remains the problem of anaesthesia which may be required over an area of the mouth, instead of just a single tooth. This is

overcome almost to perfection by the use of regional anaesthesia, blocking the conduction of the third and second divisions of the trigeminal cranial nerve. Anaesthetization of the inferior alveolar nerve is possibly the commonest injection for operations on the mandibular teeth. In a high percentage of cases it is quite satisfactory and the failures are due to specific causes that may usually be detected. Many of them are due to anatomical variations. Two injections are required for anaesthesia, one for the inferior alveolar, the lingual, and the mylohyoid nerves, and the second for the long buccal nerve. The inferior alveolar nerve is reached in the pterygo-mandibular space just before it enters the mandibular foramen. The space is filled with loose connective tissue and a variable amount of fat, the lingual nerve lying in front of the inferior alveolar nerve. Behind and lateral to the inferior alveolar nerve lie the inferior alveolar artery and vein, which converge together to enter the mandible. The foramen lies in the same plane as the lower molars, and its position is easily judged by placing the fingers over the molar teeth, with the tip of the nail along the internal oblique ridge. The 42-mm. needle is inserted into the tissues at a point corresponding to the centre of the nail. It is advanced between the tendon of the temporal muscle and the anterior border of the internal pterygoid muscle, the syringe being held over the bicuspid of the opposite side of the mouth with the mouth wide open. The needle is moved forward in the same plane until the bone is just touched; it is then withdrawn slightly, as the nerve lies away from the bone, and to avoid injury to the artery and vein lying behind the nerve. The lingual nerve is saturated with solution either before the main nerve or afterwards while the needle is being withdrawn. The mylohyoid nerve is given off just before the inferior alveolar nerve enters the foramen, and will be anaesthetized at the same time. This nerve occasionally gives off an anterior branch between the lower border of the mandible and the mylohyoid muscle and enters the mandible near the first bicuspid.

If the nerve is given off from the inferior alveolar at a higher point than usual it may

not receive any solution and remain unanesthetized, and an additional injection is required on the lingual side of the mandible. It is possible this branch nerve is responsible for the lack of anesthesia on the lower central teeth. The reason once given for this was an anastomosis of the nerves at the midline, so that the nerves are received from both right and left sides. This has not been proved, since the two mandibular halves are separated by the symphyseal cartilage until the end of the first year of life, and nerves are not known to cross a median cartilage. In the same way there can be no possibility of the so-called cutaneous colli nerve from the cervical plexus, as developmentally this would not be expected, and in any case this nerve has never been found by dissection. Failure of anesthesia may be due to anatomical variations or to depositing the solution in an area away from the nerve; but a careful study of the anatomy will enable the operator to overcome these difficulties. The long buccal is anesthetized by an injection into the centre of the retromolar fossa about 10 mm. above the occlusal plane of the lower molars, until the bone is touched, and then the needle is withdrawn about 2 or 3 mm. This is above the plane of insertion for the inferior alveolar nerve and is the reason why two injections should be performed, instead of trying to anesthetize all the necessary nerves with one injection. As all responses in the lower teeth may be blocked by an injection in this area, its anatomical importance is apparent.

The situation in the maxilla is rather more complicated, although all the teeth are supplied by the second division of the trigeminal cranial nerve. Blum (1934), summing up the anatomical evidence of the innervation of the maxillary teeth, states: "We must necessarily come to the conclusion that the teeth are not innervated by the posterior, middle, and anterior superior dental nerves directly, but through the medium of the superior dental plexus". The three maxillary molar teeth may be anesthetized by depositing the solution around the superior posterior alveolar nerve, which may best be reached where they enter the bony canal in the posterolateral wall of the maxillary sinus. This point is found on a

vertical line immediately behind the last molar, half way between the alveolar border and the orbital surface of the maxilla, and injection should be performed with the mouth as closed as possible. The puncture of the oral mucosa is done at the buccal fold by the distal half of the second molar, except in young children where the third molar is unerupted, when the first molar is used as a guide. In this injection deep-seated hematoma may occur, which will cause considerable swelling in the cheek. It has been thought that this is due to injecting into the pterygoid plexus of veins, but the rapid development tends to show that it is more likely to be due to an injury of the superior alveolar posterior artery. Only an arterial bleeding under relatively high pressure can cause such a condition in a short space of time.

The anterior superior alveolar nerve is given off from the infra-orbital nerve about 10 mm. from the infra-orbital foramen. To achieve a full anesthesia of this nerve it is suggested that the injection should actually be made into the canal, and, from the anatomy of this area, the injection should be made extra-orally through the skin. Nevertheless, it is usually performed by depositing the solution at the entrance of the infra-orbital foramen by puncturing intra-orally over the second maxillary bicuspid. The success of this injection is dependent on exact anatomical landmarks. It is found in this injection that anesthesia does not always extend to the midline and that the central incisors are not always anesthetized completely. As with the lower incisors, it has been claimed that this may be due to a crossing over of the nerves from the right to left. Although this would be true for the skin, it is not so for the teeth, and the embryological development of this area does not support the theory. It is apparent in cases of full clefts of the premaxilla that the anterior superior alveolar nerve could not supply the teeth of the premaxilla, and that in these cases the nerve-supply is from the nasopalatine nerve, branching from the nasopalatine canal to the apices of the central teeth, either direct or by joining the medial fibres of the anterior superior alveolar nerve. Anesthesia of this area is not too easy, particularly

in the operation for apicectomy, and numerous methods have been put forward to overcome this unpleasant sensitivity of the deeper tissues. Intra-osseous injection does not seem to make much difference, although it is possible that if a deeper intra-osseous injection were performed, nearer to the nasopalatine canal, it might help. There are, as far as is known, no reports on this. Cocaine may be used to desensitize the floor of the nose by applying a gauze strip impregnated with 10 per cent cocaine and by infiltration anaesthesia of the nasopalatine nerve. It would appear best to anaesthetize the nasopalatine nerve by a direct injection through the palate. To introduce the needle into the right incisive canal the tissue is punctured on the left side of the palatine papilla and directed upwards, slightly backwards, and towards the midline. Care must be taken not to enter the nasal floor, so the needle should not be advanced too far into the canal. It has been suggested by some authorities that the extra innervation is not from the nasopalatine nerve but from the anterior ethmoidal nerve, a branch of the first division of the trigeminal nerve. Whatever the origin of the nerve-supply, it should be possible to block the path by these methods.

Injections for dental local anaesthesia are nearly always performed intra-orally, but techniques have been devised for extra-oral routes. The inferior alveolar nerve may be approached through the skin by the lower border of the mandible, or through the sigmoid notch. The infra-orbital injection may be made through the skin as already mentioned. The second division block may also be made extra-orally or intra-orally through the pterygopalatine canal. All these methods claim advantages and safety, but it is felt that these injections should be used only by those with great skill and anatomical knowledge. They are never in common demand, such as are the intra-oral routes.

It should be possible with modern knowledge and techniques to give local anaesthetics for nearly all dental operations, unless there is gross swelling and infection. We have not by any means reached the end of the road, but we have come a long way since it was claimed that

"to escape pain in surgical operations is a chimera, which we are not permitted to look for in our time"; to to-day, when we can say in the words of Diffenbach, "The beautiful dream to eliminate pain has become a fact; pain, the highest consciousness of our earthly existence, its clearest conception of the imperfections of our body, has to bow low before the powers of the human mind."

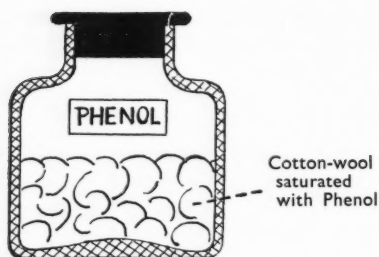
SUMMARY

The whole subject of local anaesthesia in dentistry is reviewed from early times to the present day. The aspects discussed are those of pain and its relation to anaesthesia, the physiological action of local anaesthetics, their pharmaceutical properties, and the anatomical basis of injection techniques.

BIBLIOGRAPHY

- ANGELMAN, J. (1946), *Brit. dent. J.*, **80**, April.
 — (1947), *Dent. Rec.*, June.
 BENEDICT, H. C., DAILEY, H. T., and FREEMAN, C. W. (1929), "Studies in Local Anaesthesia", *Dent. Cosmos*, **71**, July-October.
 BLOOM, D. D. (1934), *Ibid.*, **76**, October.
 BLUM, THEODOR (1934), *J. Amer. dent. Ass.*, **21**.
 COHEN, S. I. (1947), *Amer. J. orthodont. & oral Surg.* (Sect. *Oral Surg.*), **33**, 290-300.
 DILLON, CHARLES (1941), *Brit. dent. J.*, **70**, No. 9.
 DOHERTY, J. A. (1935), *Dent. Cosmos*, **77**, June.
 DOUBLEDAY, F. N. (1929), *Brit. dent. J.*, Sept., 16.
 FOSDICK, HANSON, and DRAGSTEDT (1930), *Proc. Soc. exp. Biol.*, N.Y., **27**, 533.
 JEFFRIES, C. N. (1944), *Brit. dent. J.*, **77**, No. 6.
 KIESOW, F. (1928), *J. gen. Psychol.*, **1**, 199.
 LEATHERBARROW, W. (1936), *Brit. dent. J.*, **60**, No. 3.
 MINNITT, R. J., and GILLIES, J. (1945), *Textbook of Anaesthesia*. Edinburgh: E. & S. Livingstone.
Modern Dentistry. Brooklyn, N.Y.: Novocol Chemical Mfg. Co. Inc.
 RESTARSKI, J. S. (1944), *J. Amer. dent. Ass.*, **31**, No. 9.
 — (1946), *J. dent. Res.*, **25**, 433-440.
 SCHNEIDER, J. J. (1936), *Northwest. Univ. Bull.*, May.
 — (1940), *Ibid.*, July.
 SICHER, H. (1946), *J. Amer. dent. Ass.*, **33**, No. 23.
 — (1948), *Oral Anatomy*. London: H. Kimpton.
 STEADMAN, F. St. J. (1929), *Brit. dent. J.*, **50**, No. 20.
 THEXTON, R., WISHART, C., and BAXENDALE, W. P. (1950), *Brit. dent. J.*, **88**, No. 8.
 TRAINER, M. L., and THRONDSO, A. H. (1940), *J. Amer. dent. Ass.*, **27**, No. 1.
 — — — (1941), *Ibid.*, **28**, No. 8.
 WINTER, F. R., and BAYLISS, L. E. (1948), *Human Physiology*. London: J. & A. Churchill.
 WOLFF, H. G., and HARDY, J. D. (1945), *Physiol. Rev.*, **27**, No. 2.
 — — and RAY, B. (1940), *Arch. Surg.*, **41**, 813.

ILLUSTRATED HINTS



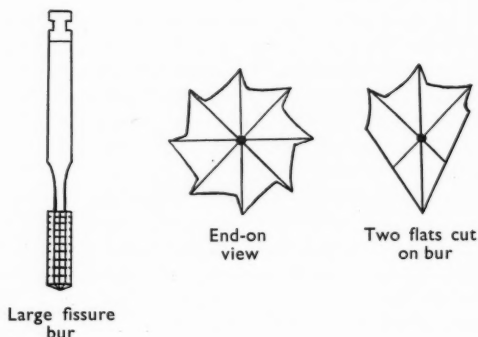
'SAFETY BOTTLES'

Place some cotton-wool in a small bottle and saturate with phenol. This way, if you knock the bottle over, the phenol will not run out.

Another drug for which this method is especially useful is zinc chloride.

A BUR FOR EASY AND RAPID REMOVAL OF AMALGAM FILLINGS

Using a carborundum wheel, two flats are cut on the bur. Thus only one-third of the original cutting surface is left. Try this yourself—it is most efficient.

**READERS !**

Let us have that hint of yours, and, if possible, send us a rough drawing or a photograph to illustrate it.

All hints published will be paid for at the standard rate for contributions.

We are relying on *YOU* to keep these pages going and to help your colleagues with useful tips.

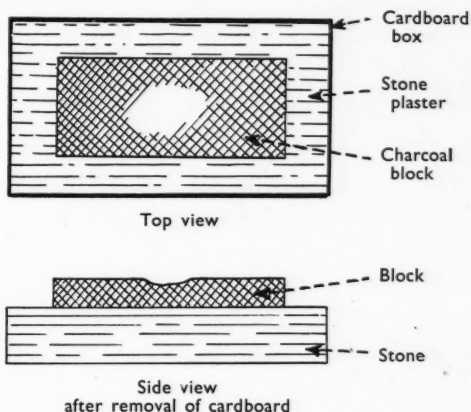
The Editor.

FOR THE TECHNICIAN

STRENGTHENING YOUR CHARCOAL SOLDERING BLOCK

1. Cardboard box a little bigger than the block.
2. Three-quarters fill box with stone plaster.
3. Embed block in centre of this to about half its depth.
4. When stone is set remove cardboard.

The result is a soldering block easy and clean to handle and difficult to fracture.

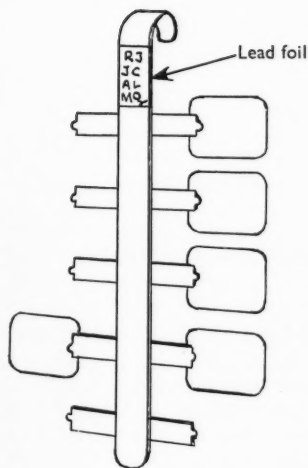


FOR THE NURSE-RECEPTIONIST

EASY MARKING OF X-RAYS ON FILM CLIP

Wrap a piece of lead foil, as found in each X-ray film pack, around the top of the film clip, and with a blunt-pointed instrument, inscribe the initials of each patient whose films are on the clip, in the order you arrange them.

Use a fresh piece of lead foil for each new series of films.



SILVER ALLOY AMALGAM*

SOME FACTORS GOVERNING ITS CONDENSATION

By E. LIEBIG, B.S., Newark, N.J.

PACKING and condensing plastic silver amalgam into the tooth cavity is possibly the most important of all the critical operations in building a lasting and enduring silver alloy amalgam restoration. More unsuccessful amalgam fillings can be attributed to faulty manipulation during condensation than to any other one cause.

Plastic amalgam (Liebig, 1945) can be considered to consist of:—

1. Solid alloy particles coated with amalgam;
2. Amalgam in a finely divided state;
3. Free mercury.

This mixture is formed during trituration of the alloy and mercury when the surfaces of the alloy particles absorb mercury and a film of amalgam is formed on the particles. Since trituration is a process of abrasion, the film of amalgam is partly rubbed off the coated particles during this operation to create finely divided amalgam, which, together with the free mercury, constitutes the semi-fluid portion of the amalgam which makes the mixture plastic.

This semi-fluid material is generally termed the 'excess' mercury. However, the finely divided amalgam is continually crystallizing and unless the 'excess' mercury is left in the mixture, and the mixture is constantly kneaded or manipulated, a crystalline network is set up which reduces plasticity. It is therefore necessary to leave the 'excess' mercury in the amalgam, until ready for condensation, and to knead or mull the portions to restore plasticity before placing them in the tooth cavity.

The more the 'excess' mercury is expressed from the portions to be inserted, the less will be the plasticity, although some plasticity is restored by manipulation with the condensing plugger.

* Reprinted by kind permission, from *Dental Survey*, 1947, February.

REPLASTICIZING HARMFUL

In the making of a very large restoration, the time required for thorough condensation may be such that the amalgam on the table would harden to a point where it would be difficult to plasticize. Mulling or kneading to replasticize a partly hardened amalgam breaks up the crystalline structure which has begun to form between the coated particles. This finely divided amalgam, together with whatever free mercury is present, forms a semi-fluid material which restores some plasticity.

However, replasticizing the amalgam while it is in this condition is harmful because the amalgam is harsh and gritty in the beginning. The rubbing of particle against particle results in a further reduction of particle size and creates an amalgam which while it is setting will show a greater initial contraction and poor resistance to flow. Therefore it may be advisable in the case of a very large restoration to use two or even three mixes to avoid any possibility of over-worked amalgam.

Plasticity during condensation is important, as the packing force is more easily transmitted throughout a somewhat fluid plastic mass than is the case with one which has begun to harden.

CONDENSATION

Condensation is an operation whereby the coated particles of alloy are packed by means of a plugger into the minute irregularities in the cavity floor and walls and into intimate contact with one another, thereby displacing the 'excess' mercury which was used to keep the mass plastic and to lubricate the particles and thus enable them to slide into place more readily.

The force required for plugging the particles is somewhat proportional to the amount of amalgam contained in each portion placed in a cavity of a given size. The smaller the portions of amalgam, the less will be the

packing force required. From the laboratory viewpoint, ideal conditions of packing would be attained by following a procedure analogous to that used by a mason in building a brick wall.

Each brick is carefully placed into the most intimate relationship with the next with only cement between, to produce a sound and compact structure very strong in compression. If it were possible to achieve equal precision with the individual amalgam-coated particles, we should have the ideal filling, but although this is impossible, the analogy is useful and should be kept in mind when determining the size of the portion of amalgam to be cut from the plastic mass for condensation.

Any manipulation, such as the use of properly designed mechanical or pneumatic condensers, or the use of fairly heavy hand pressure on a comparatively small plugger point, together with plugger motion which would cause the particles of alloy to pack close together and against the cavity floor and walls with a minimum amount of abrasion or working, would contribute to the production of a satisfactory restoration.

PARTICLE SIZE AND SHAPE IMPORTANT

The size and shape of the silver alloy particles are an important factor in governing the amount of energy necessary for proper condensation. The particles of alloy do not altogether lose their identity during trituration as indicated by a comparison of the texture of amalgam made from a finely cut alloy with that of a coarsely cut alloy.

The finely cut alloy will invariably produce an amalgam with a smooth, fine grain texture while the coarsely cut alloy will give a coarse, gritty texture when the amalgam is spread out on the palm of the hand by means of the fingers.

Coarsely cut, jagged and curled chips of alloy form an amalgam which is difficult to condense into a sound body because they tend to bridge and web when packed together as indicated by the crunching effect obtained when a condensing force is applied. A large part of the packing force is thereby absorbed

and unless the force is great enough to break through the resistance offered by the interlocking particles, a sound dense structure is not attained.

PACKING CHARACTERISTICS

The packing characteristics of silver alloy particles, which vary in size and shape, can readily be demonstrated by vibrating one ounce of alloy in a Brown and Duval 25 cubic centimetre graduate to a constant volume. Tests of the popular commercial alloys give apparent specific volumes of 7.5 to 10.5 cubic centimetres. The alloy with a volume of 7.5 cubic centimetres will require less condensation force than the one with a volume of 10.5 cubic centimetres in order to obtain the same close packing. That an alloy has the lowest apparent specific volume does not necessarily mean it is largely composed of the small particles, for it has been found that the blending of particles which vary in size and shape is an important factor in obtaining the closest packing arrangement.

The effect of variations in condensation pressure on dimensional changes of the amalgam is not as sensitive when using finely cut, uniformly shaped, particles as it is when using

Your Opinion, Please!

THE filling in $\sqrt{4}$ is a zinc-oxide-eugenol.
What are the white markings between $\sqrt{4}$ and $\sqrt{5}$?



Write to the Editor and give him
your diagnosis.

coarsely cut, jagged curled chips. Coarsely cut chips do not pack close together under normal condensation pressures and therefore more free mercury could be retained in the spaces between the coated particles. Retained free mercury allows the solution reaction to continue for a longer period of time than usual which under most conditions increases the initial contraction. Also, more compound or amalgam is formed which when crystallizing may lead to a greater overall expansion. It is possible to prepare a dental amalgam alloy with particles that are so shaped and graded that the use of a wide range of condensation pressures will not cause a detrimental variation in dimensional changes.

During the condensation of each portion of amalgam inserted into the cavity, the 'excess' mercury is displaced and forced to the surface to form a layer of plashy amalgam. This plashy material will mix readily with the next portion of amalgam inserted into the cavity to create an indefinable bond between the two portions. If the plashy amalgam is completely removed

before adding the next portion, the surface of the portion last condensed will begin to harden rapidly and will not allow a good interlocking bond with the next portion, with the subsequent result that the amalgam restoration will show laminations and will be weaker in tension. However, too much plashy material should not be left on the surface because it will dilute the next portion of amalgam added to make it too plastic for easy condensation.

Hardening of the amalgam proceeds at a much faster rate when condensation has been thoroughly done. If the coated particles of alloy are packed as closely as possible, the free mercury is more completely eliminated by displacement and the amalgam mass will form a hard crystalline structure quickly. Free mercury, left in the amalgam, retards setting by weakening the crystalline network and affects the physical properties detrimentally, especially by decreasing the resistance to flow.

REFERENCE

- LIEBIG, E. (1945), "Some Physical Aspects of Plastic Dental Amalgam", *Dent. Survey*, June.

SOCIETY NOTES

THE BRITISH DENTAL STUDENTS' ASSOCIATION

WHEN asked to write something about the British Dental Students' Association for inclusion in this new dental journal, my first thought was: "How much will the readers know about B.D.S.A., and, in fact, how many are aware of its existence?" It would seem, therefore, an excellent opportunity to tell members of the profession something about this association, which acts as a connecting link to all the dental students in the United Kingdom.

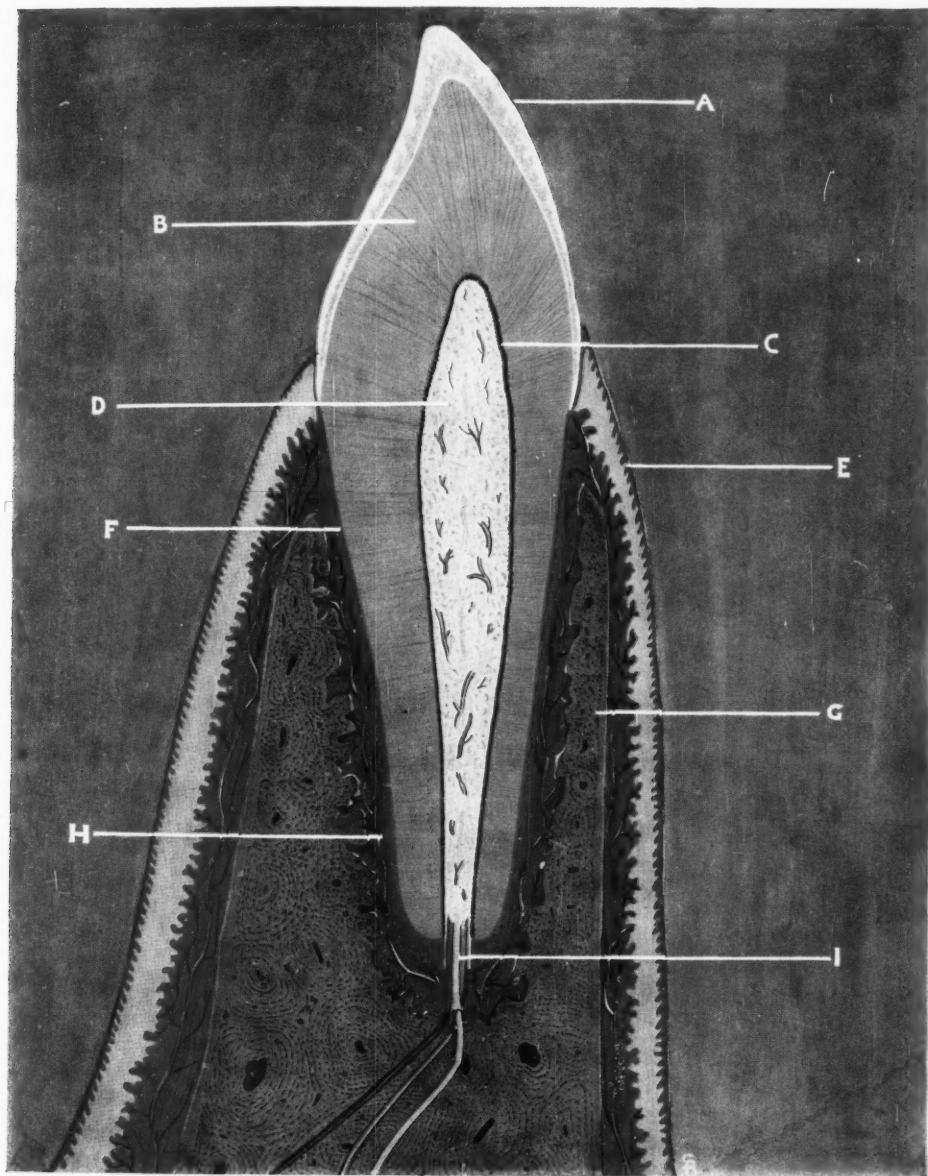
The B.D.S.A. is a society of students which was founded by representatives of the Dental Schools of the United Kingdom in 1942. At the inception of the association the objects of the proposed society were put forward as being: "To represent the Dental Students of the United Kingdom, and to promote their educational and social interests, to improve

the Dental Service to the nation, and to correlate the activities of the individual Dental Students' Societies."

B.D.S.A. is governed by a Council, which consists of elected representatives from every dental school in the United Kingdom, and the Executive, elected by the Council each year, carry out the general business of the Association. For general convenience the schools are divided into three regions, Northern, Midland, and Southern, each region having its own Council consisting of the representatives of the schools in that region.

Membership of B.D.S.A. is not restricted only to dental students. Terms of Associate Membership are available for any member of the dental profession to whom student activities are still of interest. Not only does this give the student members a chance to

COLOURED CHART No. 1
LONGITUDINAL SECTION OF A TOOTH IN SITU



A, Enamel; B, Dentine; C, Odontoblasts; D, Pulp; E, Epithelium of gum; F, Cementum;
G, Osseous tissue; H, Periodontal membrane; I, Blood-vessels and nerve.

H.M.

C
t
L
i
t
C
i
t
a
g
H
h
H
e
C
f
P
a
F
a
f
a
h
o
d
S
d
ta
B

meet with and mix with established members of their chosen profession, but gives the ordinary practitioner an opportunity to contact and help his future companions.

A journal is published tri-annually and contains articles of dental interest in addition to reports from the various schools. During the course of each year one Annual and two Regional Conventions are held. At these meetings students from every school are invited to see how other hospitals are tackling their problems—to meet the staff and students of these hospitals—and to attend lectures by prominent speakers on matters vitally interesting to dental students, as well as to take part in the social functions which are inevitable items on any convention programme.

This year the Ninth Annual Convention was held at Guy's Hospital Dental School, the home school of Mr. F. S. Warner, retiring Honorary Senior President, and the week commencing July 24 was devoted to the Convention. In addition to seventy visitors from the other British Schools we were very pleased to welcome fifteen delegates from abroad as representatives from Denmark, Finland, France, Holland, and Sweden. In addition, we had hoped to welcome visitors from Norway and Switzerland, but unfortunately they were unable to attend.

At the Annual General Meeting, which was held during the week, Professor H. H. Stones, of Liverpool, was elected Hon. Senior President for the coming year, and the following Student Officers were elected:—

G. Lewis (*Manchester*), Hon. Student President.

H. Harries (*Newcastle*), Hon. Secretary.

Miss M. M. Bennie (*Glasgow*), Hon. Treasurer.

A. G. Orme (*Guy's*), Hon. Publicity Secretary.

C. G. Curry (*Liverpool*), Hon. Editor, B.D.S.J.

D. M. Storrar (*Birmingham*), Hon. Assistant Secretary.

As is usually the case at a B.D.S.A. Convention, there was a very full programme, both academically and socially, but there was still ample opportunity for the various delegates to meet and discuss various techniques and differences in their respective schools. In addition to trips to Windsor, Hampton Court, and places of interest in London, and a river trip to Greenwich, a Tennis Tournament had been arranged, but unfortunately was rained off. Theatre parties were arranged and three London theatres were visited during the week.

On the academic side the following lectures were given: "Some Chemical and Physical Properties of the Silicate Cements", by Mr. F. N. Doubleday, F.D.S., M.R.C.S.; "A Study of Muscle Behaviour in Relation to Some Orthodontic Problems", by Dr. E. Gwynne Evans; "Crime and the Dentist", by Dr. Keith Simpson. A film, "Serial Study of Occlusion from Birth to Ten Years of Age", was shown by Mr. K. Pringle, L.D.S.

The Convention ended, all too soon, with the Annual Dinner and Dance, but a memorable week had been spent, and valuable knowledge had been gained by those students attending the Convention, of each other's work and way of life, thus enabling them to gain a wider outlook on their future profession.

It is hoped that in this brief history and account of the activities of B.D.S.A a picture has been given of the work and life of the dental student of to-day; from which it will be seen that the present-day student is not unaware of the great responsibility he has to bear in the years to come, and that he is doing his utmost to gain a broader outlook on his chosen profession and to establish closer contact with his fellow students.

G. F. THOMPSON,
L.D.S., R.C.S. (Eng.).

[The Secretaries of Dental Societies and Kindred Associations are invited to send Reports of Meetings, etc., for publication in this regular feature.—EDITOR.]

AMSTERDAM AND DENTISTRY

Impressions from the Annual Meeting of the American Dental Society of Europe

IN the rush of modern life, with appointment books filled to capacity, one's pleasures have as often as not to be combined with business. With this in mind it was a delight to travel to the historic and picturesque city of Amsterdam and attend the annual meeting of the American Dental Society of Europe. Under the able presidency of Mr. K. C. Campbell, of London, the meeting brought together members of the dental profession, not only from the countries of Europe, but from the four corners of the world.

The meeting was held in the Royal Institute for the Indies, surely one of the finer lecture halls in Europe, and was opened with a speech by the Minister of Social Affairs of the Netherlands Government. The Society was given a reception in the evening by the Burgomaster and Aldermen of the City of Amsterdam in the famous Stedelijk Museum. The Burgomaster, in a delightfully witty speech, mentioned that having looked through the programme there seemed to be much in common with Dentistry and his own sphere of work, and that it was appropriate that this meeting was being held in Amsterdam. For apparently we were to discuss a new method of fixing bridges, and as the city had four hundred and fifty bridges over their canals it was a point of common interest. So, too, the clinic on how to keep the field dry when the use of the rubber dam was impossible—a problem that the Dutch people had been tackling for centuries, in a rather larger way.

Discussion was always on a high level, with an international outlook on the broadest plane. Lecturers and clinicians came from places as far apart as Chicago and Utrecht, Buenos Aires and Tunbridge Wells, Seattle and Zurich, Mexico and Paris. Whatever your speciality there was nearly always something new to see and learn, either from one of the

thirty table clinics or from the more profound lectures given each morning. Despite the high-sounding titles of some of the demonstrations the keynote of the meeting was for the practising dentist, and few men came away without learning something new that would be of use in the normal routine of treatment. As usual at an American meeting, all the models in the presentation of methods and cases were beautifully finished and fitted with perfect accuracy. They set a standard which it would be hard to improve upon.

For pleasure during the few hours off, one could tour the ancient canals in an ultra-modern water-bus, and return to see a film on the Mexican Indians. One could wander through the famous museums and become enthralled by the beauty of the old Dutch masters, to return again and watch with amazement the perfect exactness of small precision attachments sliding into one another to form some complicated bridge. Crouched over their models with small magnifying spectacles perched on the end of their noses, absorbed in the minute detail of the work, they reminded me of the old Alchemists, searching for something better, something finer, than anyone else had done, and then giving it to the world.

All in all, it was more than a dental meeting. The Dutch are an hospitable nation and everything was done to make our stay in the City of Amsterdam an outstanding success, which indeed it was.

W.

"I hold every man a debtor to his profession."—FRANCIS BACON.

THE DENTAL NURSE

By M. JEAN SMITH

General Secretary, The British Dental Nurses and Assistants Society

DURING the past fifty years, great strides have been made in the practice of dentistry. In the eighteenth century the pupil dentist obtained his training by becoming an apprentice to a practising dentist, when he learnt the surgical art of the work by watching and helping the operating dentist in the surgery.

When in the nineteenth century dental education was organized in Schools, the practising dentists lost their apprentices and, being deprived of this help in the surgery, found it necessary to engage women to help not only in the capacity of secretary but also to assist in the surgery.

In the early years of this century the woman employed in a dental practice had many duties to carry out. Primarily she was receptionist and secretary, and helped in the surgery in any spare time that she might have. At this time it was thought that it was not economically possible for a dentist to employ more than one woman.

Now it is a generally recognized fact that a dentist working in two surgeries and with an efficient dental surgery assistant, can increase by 60 per cent the number of patients he can treat in one week.

In order to maintain this increase and to help the dentist to keep a consistently high standard of work, the dental nurse must of course devote all her time to preparing the surgeries for use, assisting at the chairside during the operation, and rendering post-operative care to the patient.

The practice which has now proved the most beneficial and economically sound is to employ two and even more women in the dental practice: one solely for surgery duties; and another for reception duties, making appointments, etc., and to act as secretary and deal with correspondence and accounts.

With the advent of the new National Health Service and the ever-increasing amount of clerical work involved, it is being realized by many dental practitioners that the duties should be separated into three classes in busy practices—Reception, Secretarial, and Surgery.

It is usual for girls when commencing employment in a dental practice, first to become familiar with the reception and secretarial duties and then to graduate from these duties to assisting in the surgeries. Thus the training of the dental nurse is being carried out at the present time by the individual dentist himself.

Whilst this practical training is proved to be very sound in many cases, unfortunately there is no nationally recognized standard of proficiency which dental surgery assistants must prove that they have attained.

Mr. P. E. Grundy, L.D.S., of Leyland, Lancashire, knowing the value of the efficient, trained dental nurse from his own experience, founded the British Dental Nurses and Assistants Society in 1940, in order to encourage the provision of facilities for practical and theoretical instruction and the issuing of recognized training certificates for the Dental Nurse.

Since 1940 more than 2000, mainly females, assisting in dental practices as dental surgery assistants, receptionists, and secretaries, have realized the necessity and advantage of such aims and have joined the Society.

Monthly meetings are organized for members in Birmingham, Brighton, Bristol, Gloucester, Edinburgh, Leeds, Liverpool, London, Maidstone, Manchester, Newcastle, Preston, and Sheffield. At these meetings, lectures and demonstrations have been given by eminent members of the dental profession on the many varied duties which are carried out by the dental nurse.

In 1943, the Dental Nurses and Assistants Examination was instituted by a Board of Examiners which is completely separate from the Society. This Board has held examinations annually since that year.

The Society has arranged Study Circles in many parts of the country for candidates sitting for this examination.

In 1948, the British Dental Association, the Incorporated Dental Society, and the Public Dental Service Association, together with representatives of the Ministry of Education and the Ministry of Health, set up a Committee to inquire into the wages, conditions of service, and the title of women assisting dentists in public and private dental service.

The Report of this Committee was published in August, 1948, and the recommendations of the Committee, who accept the view that a

properly trained dental surgery assistant is of such value to the operating dentist as to make her virtually indispensable to the efficient practice, are: that proper training is essential for maximum efficiency; and that the Minister of Health should be asked to grant by regulation the use of the title 'Dental Nurse' to those in possession of an appropriate certificate and to those who have been employed for three or more years, earning their livelihood in the occupation of dental nurse.

In general the duties of the dental nurse are to help the dentist in much the same way as a theatre sister assists the operating surgeon in general surgery, and it falls far short of the high ideals of the dental profession that national courses of training and a standard of proficiency are not compulsory for dental nurses.



[Dental Practitioners willing to give lectures to members of the Society are invited to write to the General Secretary, 2, Sumner Street, Leyland, Lancs.—EDITOR.]

THE DENTAL PRACTITIONER

No. 2 OCTOBER

PREVIEW

The Problem of the Sensitivity of Dentine.

Eric W. Bradford, M.D.S. (Sheffield)

Fractured Anterior Teeth

E. L. Hampson, F.D.S., R.C.S (Eng.), H.D.D., R.C.S. (Edin.)

An Unusual Case of Paget's Disease

Ronald Rastall, L.D.S. (Sheffield)

Dermoid Cyst of Right and Left Ovaries

Ronald Rastall

Illustrated Hints.

Book Reviews.

Society Notes.

Abstracts.

Denture Design Chart, No. 1

Importance of maintaining Consistency of Amalgam Alloy

The variation in mercury between the top and bottom of an amalgam alloy was shown to be alarming. If an engineer was asked to build a structure, using as a unit of this structure any member which showed as great variation in any component as is shown by variations in mercury in this system, he would rightfully refuse to be responsible for its success. It would seem that

some thought could well be given by the dental profession, and by those responsible for its instruction, to the development of a technique which would obviate such variations. A restoration should have a better chance of success if the present practice of using a more fluid bottom consistency and a "dry" top consistency were discontinued, and in its place a procedure adopted in which the consistency of the amalgam being packed is uniform throughout.—STRADEN, K. H. (1949), "Amalgam Alloy, Effects of Heat Treatment", *J. Amer. dent. Ass.*, 38, 602.

Interference with Tongue and Speech in restoring Vertical Dimension

When old dentures are replaced by the new with the lost vertical restored, tongue and speech interference takes place. After resorption with the old dentures there is less space in the mouth for the tongue, which normally fills the mouth, and as the tongue is incompressible it is forced back and flattened out between the upper and lower teeth. Over a period of time the tongue permanently changes its shape to meet the new conditions, becoming flatter and broader. A few patients present tooth indentations on the sides of the tongue, but to the majority the displaced tongue becomes quite comfortable. The trouble commences with new dentures, which have the additional height, bringing the teeth back to their original level. The abnormal tongue is now restricted and is level with the

cutting edges, as it was with the natural teeth and the old dentures before resorption. The restricted tongue tends to dislodge the new dentures, and speech difficulty and tongue biting may be experienced. The tongue requires to be re-educated to place the food on a higher level during mastication.

Most patients, with perseverance, conquer these disabilities, and the tongue returns to its normal shape. Frequent replacements, however, would have prevented

ABSTRACTS from Other Journals

the tongue from spreading and avoided most of the difficulties encountered with new dentures.—BURTENSCHAW, G. H. (1948), "Importance of the Vertical Dimension", *N.J. dent. J.*, 144, 98.

Direct Capping of the Pulp and Vital Amputation

Research done in the Swiss dental schools, especially at Zurich under Professor Dr. Hess and at Basel under Professor Dr. Mueller, has proved that direct capping and vital amputation have an important place in modern preventive dentistry. Basing their conclusions on this research, the Zurich Dental School recommend Calxyl or Serocalcium as a covering drug. The otherwise equally good dentine-splinter method has the disadvantage of difficult sterilization. The School advise against Pulpatect, Ivory powder, Vitapulp, Citronellol, etc. The method can be used for old patients, although the best results will be achieved in the young—this is true, of course, of nearly all surgical operations. Although the methods can be successful even if the pulp is contaminated with saliva, rubber-dam and sterile conditions are essential. It appears, at present, that cases with more than a partial pulpitis are not likely to respond successfully to either operation.

The high percentage of success is due partly to the specific powers of Calxyl, but chiefly to the high regenerative possibilities of the pulp. The belief that a pulp once injured is a lost one should be discarded.

Definite progress in conservative dentistry can be achieved by introducing direct capping and vital amputation of pulps into routine practice.—CASTAGNOLA, L., and ORLAY, M. G. (1950), *Brit. dent. J.*, **88**, 324.

Distortion of Wax Patterns as influenced by Storage Time, Storage Temperature, and Temperature of Wax Manipulation

This article reports a study to determine how long a wax pattern for a gold inlay may be safely left before investing, the best method of storage if it cannot be immediately invested, and the influence of the temperature at which the wax is manipulated.

Results on 476 individual castings indicate that if distortion of the wax pattern is to be prevented, the pattern must be invested immediately after removal from the tooth or model. If, however, storage is necessary, a low temperature will reduce the degree of distortion.

A series of experiments on the effect of storage time revealed that if the pattern is left at room temperature the first evidence of distortion appeared within 45 minutes. The distortion becomes progressively worse with an increased period of time, up to 24 hours. None of these inlays fitted accurately.

Patterns were then left for varying lengths of time at different storage temperatures. This

showed that the lower the temperature the less was the distortion in the final inlay. A pattern stored at 36° F. for 24 hours showed less distortion than one left at room temperature for only 2 or 3 hours. Patterns that were made by softening the wax over a bunsen burner and patched with hot wax, showed the maximum distortion if left, but if stored at 36° F. even for 24 hours the distortion was negligible.

With regard to the temperature for wax manipulation, it was verified again that the higher the temperature of wax the fewer the internal strains and the less is the resulting distortion. Patterns were taken with poured wax and wax at various temperatures controlled in an electric furnace. They all produced distorted inlays save those invested immediately or stored at a temperature of 36° F.

It is apparent from this study that every endeavour should be made to invest the pattern as soon as it is taken, if an accurate gold inlay is to be achieved. The pattern should never be left lying about, but should be carefully stored at a low temperature until required. This period in all cases should be as short as possible.—PHILLIPS, RALPH W., B.S., Indianapolis, and BIGGS, DONALD H., D.D.S., Evansville, Ind. (1950), *J. Amer. dent. Ass.*, July.

BOOK REVIEWS

ANATOMY FOR DENTAL STUDENTS. By MARY LUCAS KEENE, D.Sc., M.B., B.S., Professor of Anatomy, Royal Free Hospital School of Medicine, University of London; and J. WHILLIS, M.D., F.R.C.S., Professor of Anatomy, Guy's Hospital Medical and Dental Schools, University of London. 5½ × 9 in. Pp. 342 + viii, with 220 Illustrations. 1950. London: Edward Arnold & Co. 40s.

THE requirements of the dental student in his studies of the basic sciences have hitherto

been rather ill provided for, particularly as far as anatomy and physiology are concerned. The publication of an up-to-date text-book of anatomy especially for the use of dental students is therefore very welcome. Professors Keene and Whillis have produced a book which is lucid, very well illustrated, and which fully covers the basic examination syllabus in Anatomy.

Stress is laid on the importance of function in the study of anatomy. The chapter on functional activities involving mouth, nose, and pharynx explains in concise form the

various mechanisms involved, information which the student could only find elsewhere by searching through many volumes.

Neurology, particularly the functional aspect, has tended to be a difficulty for the dental student, who has had in the past to learn a great deal more than he required from text-books designed for the medical student. In this book the chapters on neurology provide him with all the information he needs copiously and clearly illustrated. The only criticism one might make is of the 'basic' character of the chapters dealing with thorax, abdomen, and the limbs, which may not cover the requirements of the university syllabus adequately. The authors refer to this in their preface, the reason they give for this briefness being the shortness of time available to the dental student for his study of anatomy. The fault, therefore, appears to be with the dental curriculum.

Every dental student should possess a copy of this excellent book as an essential part of his equipment.

F. D. S.

DENTAL PROSTHETIC LABORATORY

MANUAL. By CARL O. BOUCHER, D.D.S., F.A.C.D., F.A.D.P., Professor of Dentistry; Chairman, Prosthetic Division; Director Dental Technology, The Ohio State University College of Dentistry, Columbus, Ohio. Second Edition. $7\frac{3}{4} \times 10\frac{1}{2}$ in. Pp. 412. with 127 Illustrations in diagram form. St. Louis, Mo.: The C. V. Mosby Company, (London: Henry Kimpton.) 31s. 6d.

This manual is written as a guide for American dental students, and is not intended to serve as a text-book. It tells how to do an operation in prosthetics by listing the instruments needed and then giving the precise procedure. Frequent references are made to seven well-known American text-books and therefore the Manual is of little use to the student over here unless he has access to these books.

The subject-matter is divided into 12 sections, covering dental prosthetics from the first mix of plaster to the fabrication and

repair of partial and complete dentures, in plastic and wrought and cast gold. Inlays, crowns, and bridgework are *not* included.

Each section is followed by a series of questions, and a number of pages are left blank for the student's notes.

The book obviously serves a very useful purpose in the U.S.A., and does show how training can be simplified both for the student and tutor and yet the efficiency be increased.

British teaching hospitals would be well advised to study this Manual, and the method employed. A similar volume written for both the dental student and the apprentice technician in the British Isles should be most welcome.

J. E. S.

PRESCRIPTION WRITING AND MATERIA

MEDICA FOR DENTISTS. By L. RICHARD CIPES, Ph.G., D.D.S., formerly Dentist, New York City Department of Health, and Mt. Vernon, N.Y. Department of Health. Third enlarged edition. $6\frac{1}{2} \times 9\frac{1}{2}$ in. Pp. 530 + xvi. 1950. New York: Dental Items of Interest Publishing Co. (London: Henry Kimpton.) 63s.

To the student of materia medica in dentistry this enlarged edition should prove a great help, for in its twelve chapters there is a wealth of information collated and classified for quick and easy reference by the busiest of dental practitioners.

Commencing with "Why the Dentists should Prescribe", the author devotes special chapters to recent developments in dental materia medica, such as the sulphonamide drugs, antibiotics, the vitamins, dental remedies and formulas, and ends this excellent book with a series of tables of practical value and interest, together with a detailed bibliography and an index.

No dental practitioner should be without this book if he wishes to serve his patients well by correlating his knowledge of general and oral pathology with the science and art of therapeutics.

H. M.

BOOK NOTICES

[The undermentioned books have been received. A selection will be made from these for review, preference being given as far as possible to new books and to those having the greatest general interest.]

A TEXTBOOK OF ORAL HYGIENE AND PREVENTIVE DENTISTRY. By RUSSELL W. BUNTING, D.D.Sc., Professor of Dentistry and Dean of the School of Dentistry, University of Michigan; and Collaborators. $6\frac{1}{8} \times 9\frac{3}{8}$ in. Pp. 240, with 137 Illustrations and 1 Coloured Plate. 1950. London: Henry Kimpton. 35s.

ACRYLIC INLAYS, CROWNS AND BRIDGES. By IRWIN ROBERT LEVY, D.D.S., New York. $6\frac{1}{8} \times 9\frac{3}{8}$ in. Pp. 128, with 151 Illustrations. 1950. London: Henry Kimpton. 27s.

MINUTES OF THE DENTAL BOARD OF THE UNITED KINGDOM, WITH REPORTS OF COMMITTEES, ETC., FOR THE YEAR 1949. Vol. XXVII. $8\frac{1}{2} \times 8\frac{1}{4}$ in. Pp. 100 + viii. 1950. London: Constable & Co. Ltd.

A TEXT-BOOK OF ORTHODONTIA. By ROBERT H. W. STRANG, M.D., D.D.S., Director of Courses in Orthodontia in the Extension Teaching Department of Temple University. Third edition. $5\frac{3}{4} \times 9\frac{1}{8}$ in. Pp. 825, with 583 Illustrations and 5 Plates. 1950. London: Henry Kimpton. 105s.

CLASSIFIED ADVERTISEMENTS

All advertisements under this heading must be prepaid. *Appointments or Situations Vacant*: 2d. per word (minimum 5s.); Box No. 6d. extra. *Other Classifications*: 3d. per word (minimum 7s. 6d.); Box No. 6d. extra. Compound words count as two words; groups of figures and initials as one word.

PARTNERSHIP VACANT

HOUNSLOW. Dental Practitioner, nearing retirement, wishes to meet younger man (preferably) with view to partnership and transfer of goodwill. Practice *very busy*, books audited. Box No. 101. DENTAL PRACTITIONER.

MISCELLANEOUS

NAMEPLATES FOR DENTISTS in Oxydised Bronze with Ceramic Enamel Lettering. Send Wording for Full-Size Proof and Leaflet, Post Free. G. MAILE & SON LTD., 367, Euston Road, N.W.1. Phone: EUSton 2938.

PROFESSIONAL STATIONERY. Distinctive well designed, and printed on good quality paper. Specimens and prices gladly submitted. **FILING CABINETS.** Indispensable for Dental Forms issued by Ministry of Health. Details on application to John Wright and Sons, Ltd., Publishers, Bristol, 8.

DENTAL AND SCIENTIFIC BOOKS may be ordered by post with complete confidence from the bookshop of John Wright and Sons, Ltd., at 42-44 Triangle West, Clifton, Bristol, 8.

PUBLISHERS AND BOOKSELLERS

THE DENTISTS' CASHBOOK. Designed by a qualified Accountant for the Profession. The simplest method of recording data necessary to prepare an income and expenditure account which will satisfy Inspectors of Taxes, with full instructions for use. Price 15s. 9d., including tax. The Charnwood Publishing Co. Ltd., Coalville, Leicester.

ESSENTIALS OF LOCAL ANÆSTHESIA IN DENTISTRY. By A. CORNFORD BOWDEN, H.D.D. (Edin.), L.D.S. (Eng.). Gives within its 60 pages a concise and lucid presentation of the essentials and offers an easily accessible reference to the subject. Price 6s., post 3d. John Wright & Sons Ltd., Publishers, Bristol, 8.

DENTURE BASE READJUSTMENT. By H. HIRSEKORN, D.M.D. A timely and practical book which describes step by step the chairside technicalities. 100 excellent illustrations. 130 pp. Price 10s. 6d., post 3d. John Wright & Sons Ltd., Publishers, Bristol, 8.

OF
RE-
HE
in.
ble

By
rec-
en-
er-
25,
50.

ord
ra.

ali-
est
me
of
d.,
d.,

N-
D.
a
nd
ct.
rs,

H.
ok
es.
d.,
rs,

	PAGE		PAGE
Sensitivity of denture, the problem of	42	Teeth, migration of, in periodontosis	167
Silver alloy amalgam, factors governing its condensation	22	— restoration by crowning	336
— nitrate in preventive dentistry	67	Thoracic surgery, dental care in patient about to undergo	82
SIMPSON, H. E.: Chronic thrush, report of two cases	347	— some aspects of interest to the dental surgeon	79
SMITH, M. JEAN: The dental nurse	27	Thrush, chronic, report of two cases	347
SNAWDON, JOHN W. E.: An unusual maxillary dentigerous cyst	105	Tool rack	91
Society Notes	24, 61, 92, 123, 159, 229, 285, 326	Tooth, acrylic, to convert to a facing	111
Sodium fluoride in preventive dentistry	68	— method of inserting gold inlay into	114
Soldering block, charcoal, strengthening of	21	— longitudinal section (coloured chart)	24
SOUL, DONALD: A case of progressive mandibular asymmetry	8	Toothbrush, the	193
Spectrometer, X-ray	85	Torch for smoothing wax	359
SPITZER, RICHARD: Maxillary protrusion, operative treatment of an unusual case	298	Tray, special, making a	225
Spongostan sterile gelatin sponge	353	Trays, impression, types of	219
Stabilizer for apically infected tooth whilst drilling to allow drainage	54	TREGARTHEN, G. G. T.: Pendulous tissue in relation to full denture prosthesis	376
Stellite	88	Two Fifty Club	93, 229
Sterilization of hypodermic syringes	56		
STERN, EDWARD S.: Some psychiatric aspects of dentistry	245	U	
Surgeon and anaesthetist	213	UNESCO Book Coupon Scheme	291
Surgical cases from dental practice	132	University College Hospital Dental Society	285
Surgical Instrument Manufacturers' Association (Dental Laboratories Section): Annual General Meeting, 258; Classes for the Senior Technician, 396; Diary 264, 296, 334, 366, 396; Editorial 291, 329, 363, 391; Greetings from the United States 296; Is this what you are looking for? 295, 334, 366, 394; Letter from the Chairman 257; London Regional One-day Conference 330; A method of processing acrylics 292; National savings 396; News from the Branches 263, 296, 331, 365, 393; News from Head Office 294, 331, 364, 393; Notice of Meeting, 160; Obituary (Andrew J. Fitzpatrick) 263; Personalities 330, 364, 392; Plaster supplies, 392; Processing acrylics, 363; UNESCO, book coupon scheme 291; Week-end Conference	259	V	
Surveyor, model	253	VIBRATOR, Croform electric	226
Sved bite-plate	111	— a simple	253
Svedion casting material	162	Visual education in dentistry	270, 305
Syringes, hypodermic, sterilization and care of	56	Vitallium	88
		Vitamin deficiency and periodontosis	170
		W	
		WADE, A. BRYAN: XIIth Congress International A.R.P.A.	283
		WARD, N. LIVINGSTONE: Reinforced jacket crowns	276
		— A review of local anaesthesia	12
		WARD, R. L.: Dentists and the law relating to negligence	205
		Wax and composition impressions	219
		— reclaiming	359
		— smoothing torch	359
		Wedge, for adaptation of matrix band to cervical margin of tooth	54
		WHEATLEY, R. J.: The outline of the full denture	183
		X	
		X-RAY spectrometer	85
		X-rays, bite-wing, in the conservation of teeth	2
		— on film clip, easy marking of	21
		— technique and darkroom procedure	351, 380
		— two on one film	224
		Xylocaine as a local anaesthetic	14
		Y	
		YATES, C. J. D.: A method of spruing cast upper palates of large area	352
		Your opinion, please!	23, 60

0
3
5
4
0

3
6
2

5
9
9
9

54
33

85
2
21
80
24
14

352
60

the
to